

GIS ANALYSIS FOR TREE MORTALITY



GOALS

- Identify trees – living and dead, with the ability to differentiate.
- Be able to determine tree heights and locations.
- Be able to determine distances from trees to County Roads and PG&E powerlines within effected area(s) of the County.
- Be able to identify trees within the PG&E right of ways to avoid project location conflicts.
- Enable ability to show Rate of Progression.

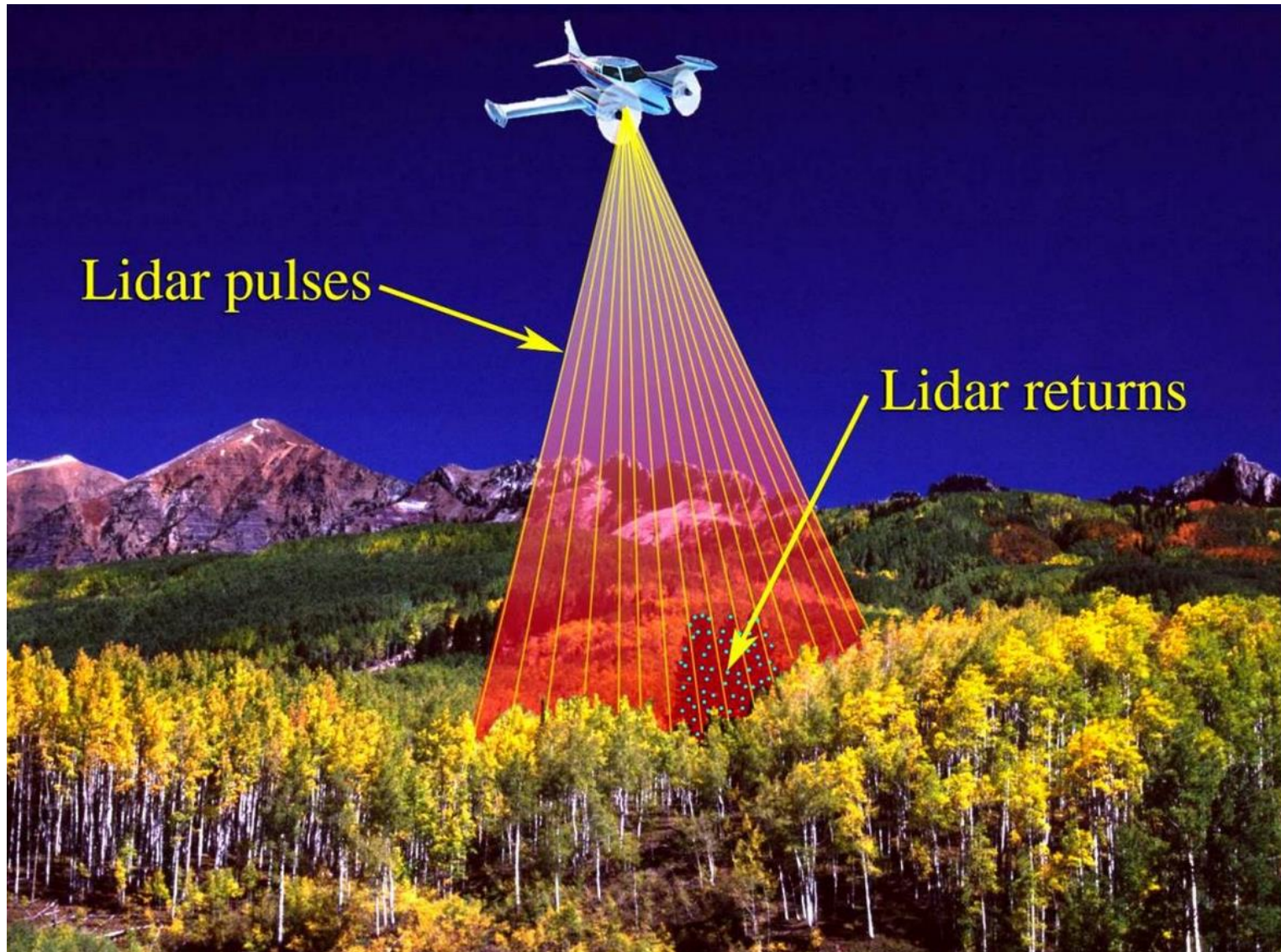
TOOLS

- GIS software- ESRI ArcGIS.
- County GIS Staff.
- 4 Band Satellite Imagery - RGB and the Near Infrared - collected end of May / early June.
- FEMA collected LIDAR data from 2011.
- Professional Services – Identification of living and dead trees.
- Ground Proofing tools to validate results of dead tree identification and locations.

STEPS TO DATE

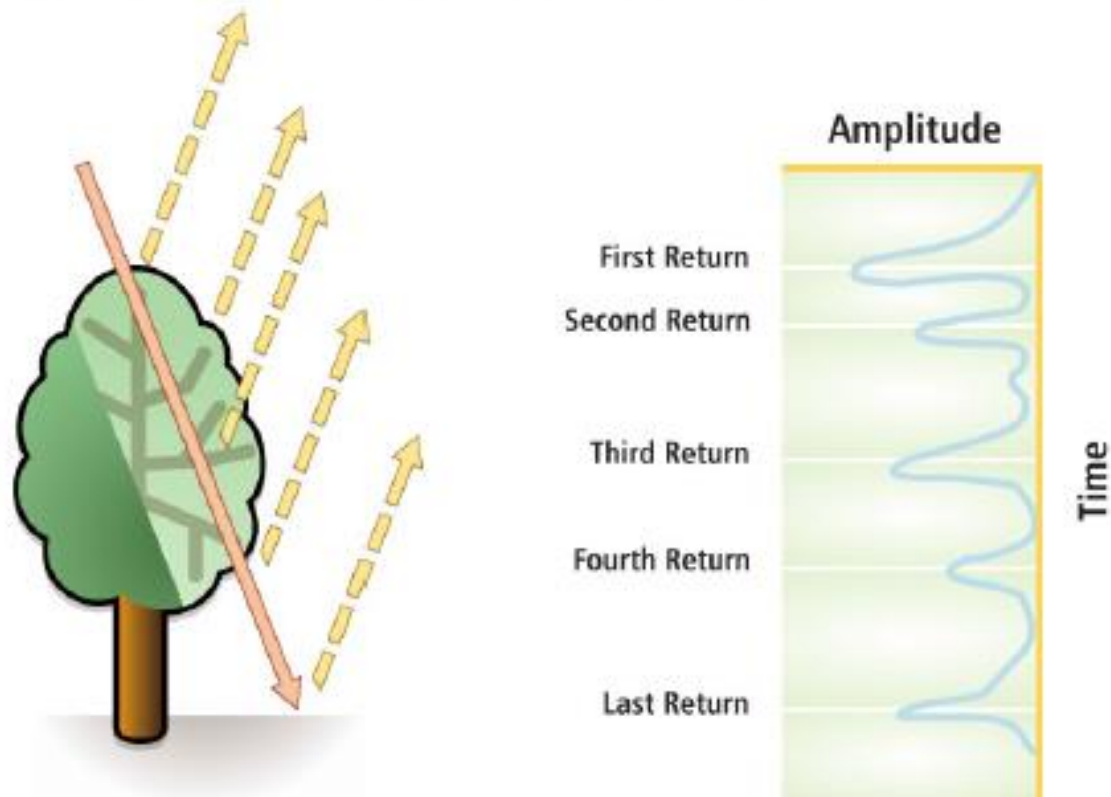
- Collected Satellite Imagery from May/June 2016 and August/September 2016.
- Incorporated the Satellite Imagery into the County GIS.
- Identified the Project Area for identification of living and dead trees.
- Identified living and dead trees within the Project Area using LIDAR and Satellite Imagery.
- Determined which trees then met the County Criteria for Removal.
- Validating results of analysis by Ground Truthing.

LIDAR



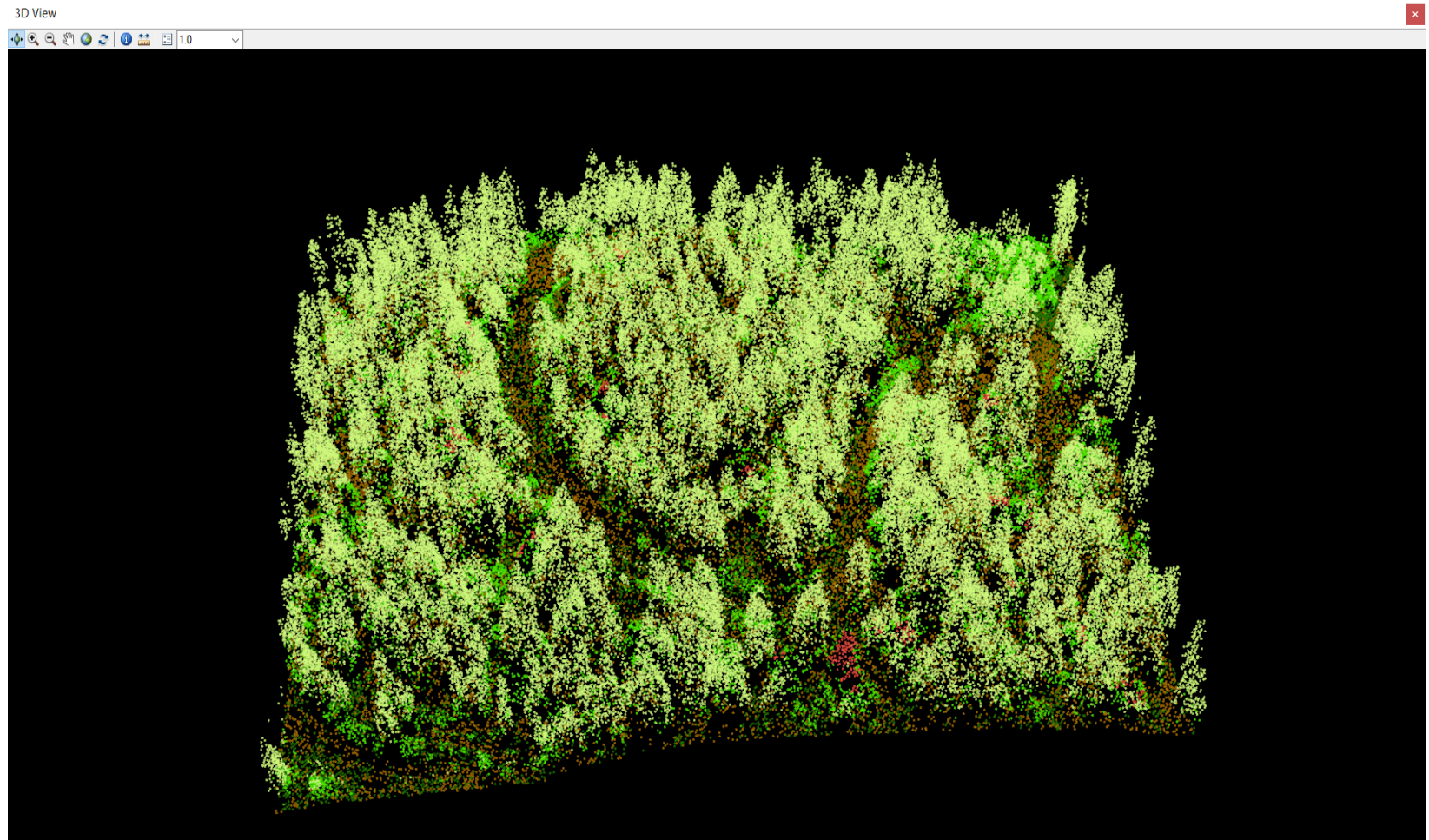
LIDAR OVERVIEW

Lidar data is characterized by very dense collections of points over an area, known as point clouds. One laser pulse can be returned many times to the airborne sensor. A pulse can be reflected off a tree's trunk, branches, and foliage as well as reflected off the ground. The diagram below provides a visual example of this process.

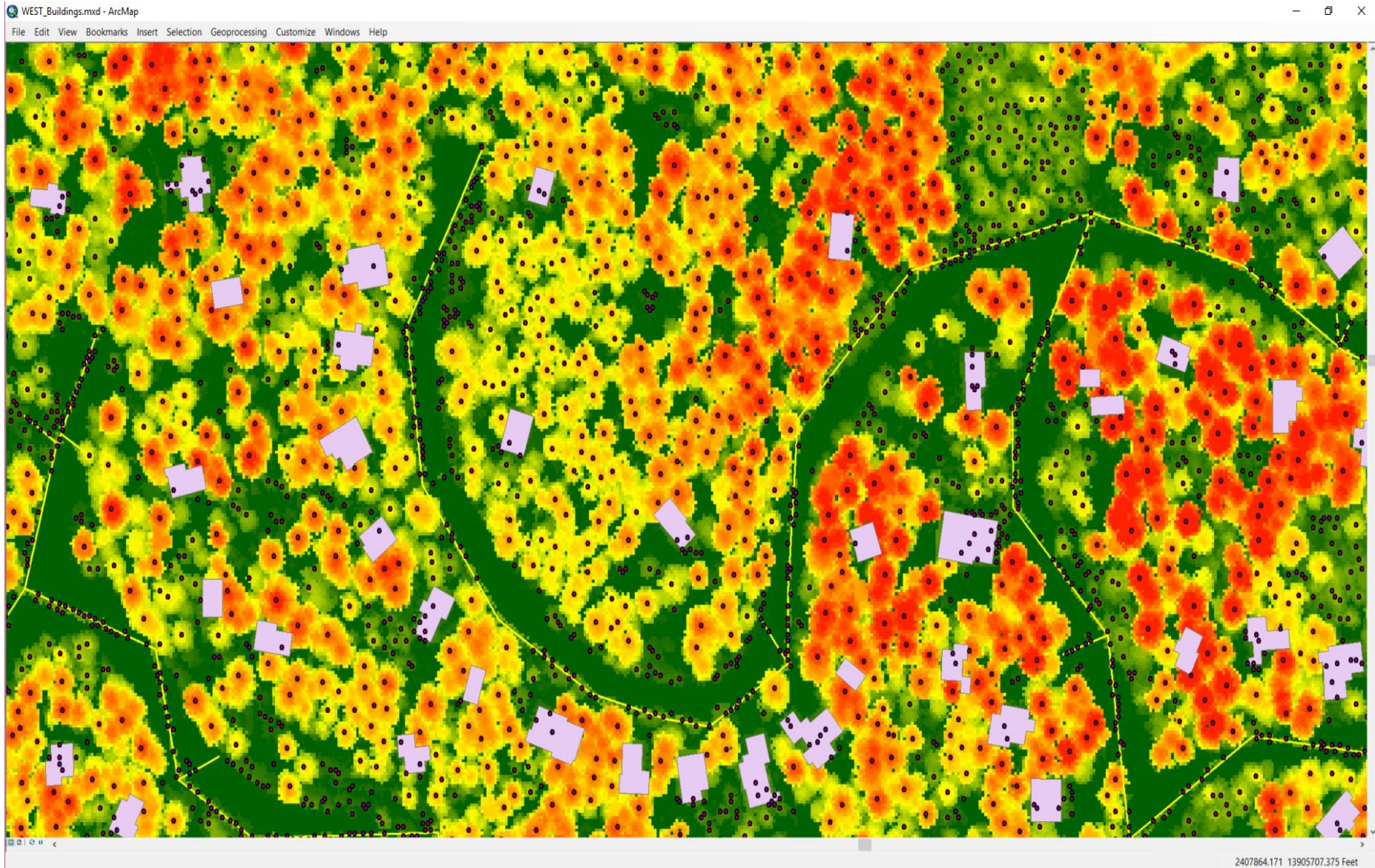


Tree Mortality Mapping with LIDAR

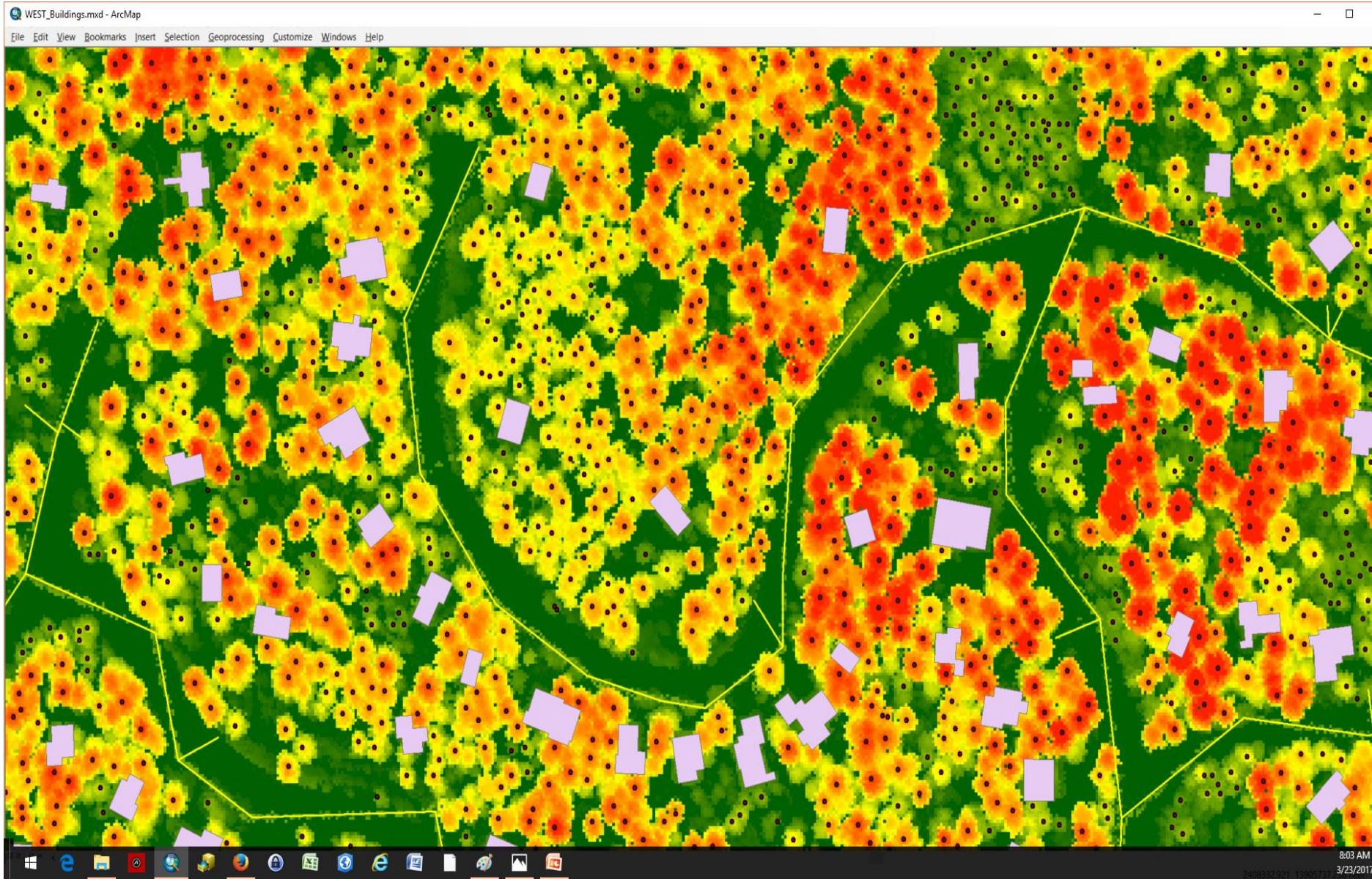
- Step 1 – Use LIDAR “point cloud” to map possible tree locations and heights.



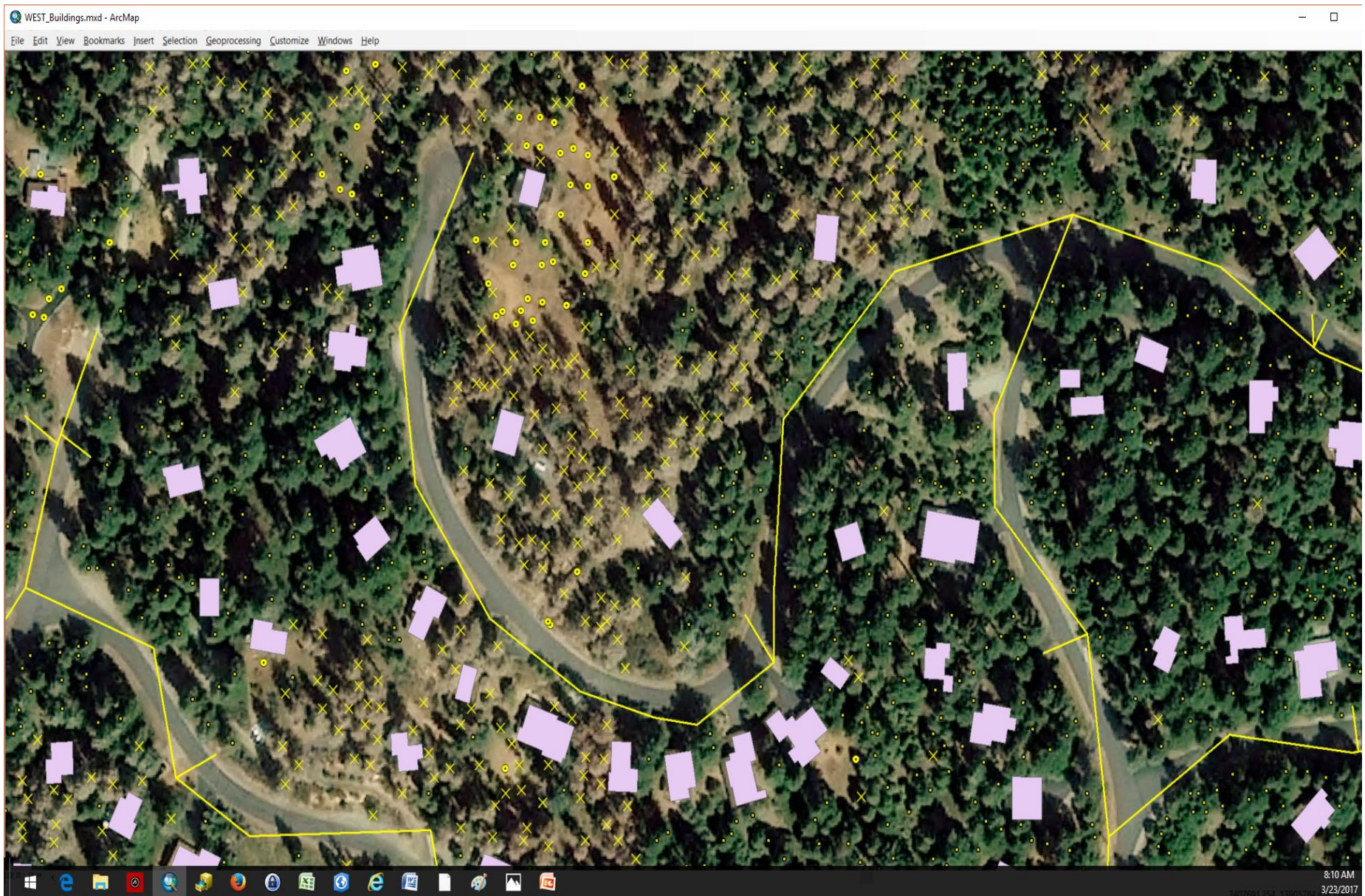
Step 2: Map Power Lines and Structures from LIDAR Data



Step 3: Delete “False” Tree Points Created by Power Lines and Structures



Step 4 Overlay Imagery to Identify Dead and Removed Trees



Step 5 Manipulate the Data

1. Add Field (DIST_EDGE)
2. Calculate (DIST_EDGE= DIST_TO_CM - 10)
3. Select (STATUS = "STANDING DEAD")
4. ReSelect (HEIGHT_FT >= DIST_EDGE)
5. Export to new Feature Dataset

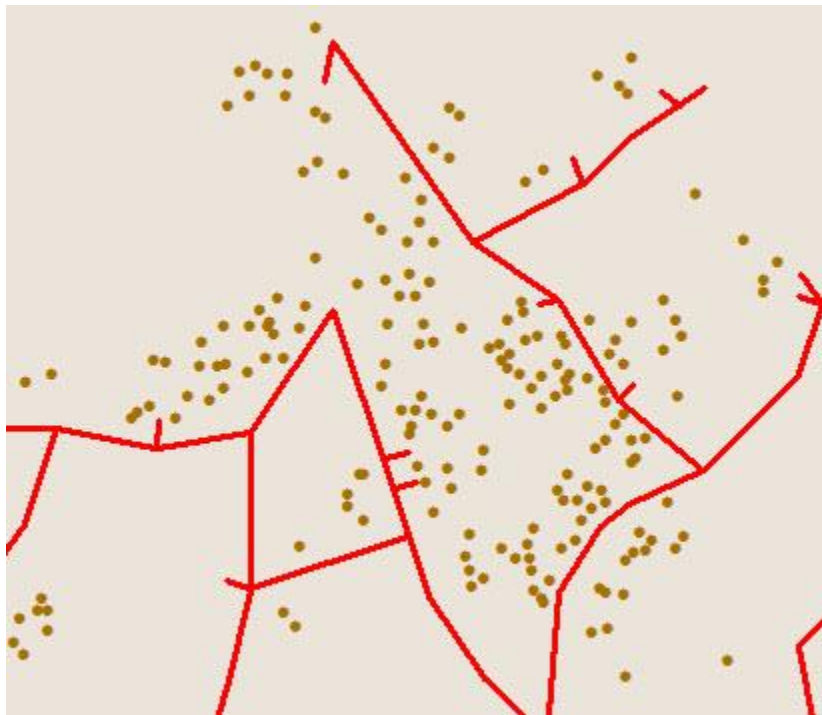
Table

NORTH30FT_BBDD

	FID	Shape *	OBJECTID	Height_ft	STATUS	Dist_to_CM	DIST_EDGE
▶	321	Point	352306	0	STANDING DEAD	0	-10
	1811	Point	1832731	30.02115	STANDING DEAD	15.312115	5.312115
	2448	Point	2225858	30.02115	STANDING DEAD	31.696906	21.696906
	3378	Point	2674440	30.02115	STANDING DEAD	31.079576	21.079576
	2169	Point	2140048	30.05396	STANDING DEAD	20.880157	10.880157
	1083	Point	900338	30.08677	STANDING DEAD	30.813466	20.813466
	2613	Point	2300948	30.08677	STANDING DEAD	4.9215	-5.0785
	1791	Point	1825867	30.11958	STANDING DEAD	35.215389	25.215389
	2889	Point	2460153	30.1852	STANDING DEAD	38.589082	28.589082
	1036	Point	880443	30.21801	STANDING DEAD	22.6389	12.6389
	1291	Point	1366508	30.21801	STANDING DEAD	15.56315	5.56315
	2509	Point	2234543	30.21801	STANDING DEAD	4.058373	-5.941627
	1242	Point	1092638	30.25082	STANDING DEAD	13.674333	3.674333
	953	Point	739458	30.31644	STANDING DEAD	15.56315	5.56315
	1025	Point	879012	30.31644	STANDING DEAD	19.686	9.686
	970	Point	798553	30.41487	STANDING DEAD	14.533016	4.533016
	1904	Point	2051978	30.41487	STANDING DEAD	3.548944	-6.451056
	2617	Point	2303034	30.41487	STANDING DEAD	11.852542	1.852542
	1635	Point	1652959	30.48049	STANDING DEAD	10.03793	0.03793
	1368	Point	1482532	30.5133	STANDING DEAD	17.414045	7.414045
	2378	Point	2212083	30.5133	STANDING DEAD	25.553915	15.553915

Step 6 Run ESRI

“Near Tool” to Determine Distance to PG&E Lines



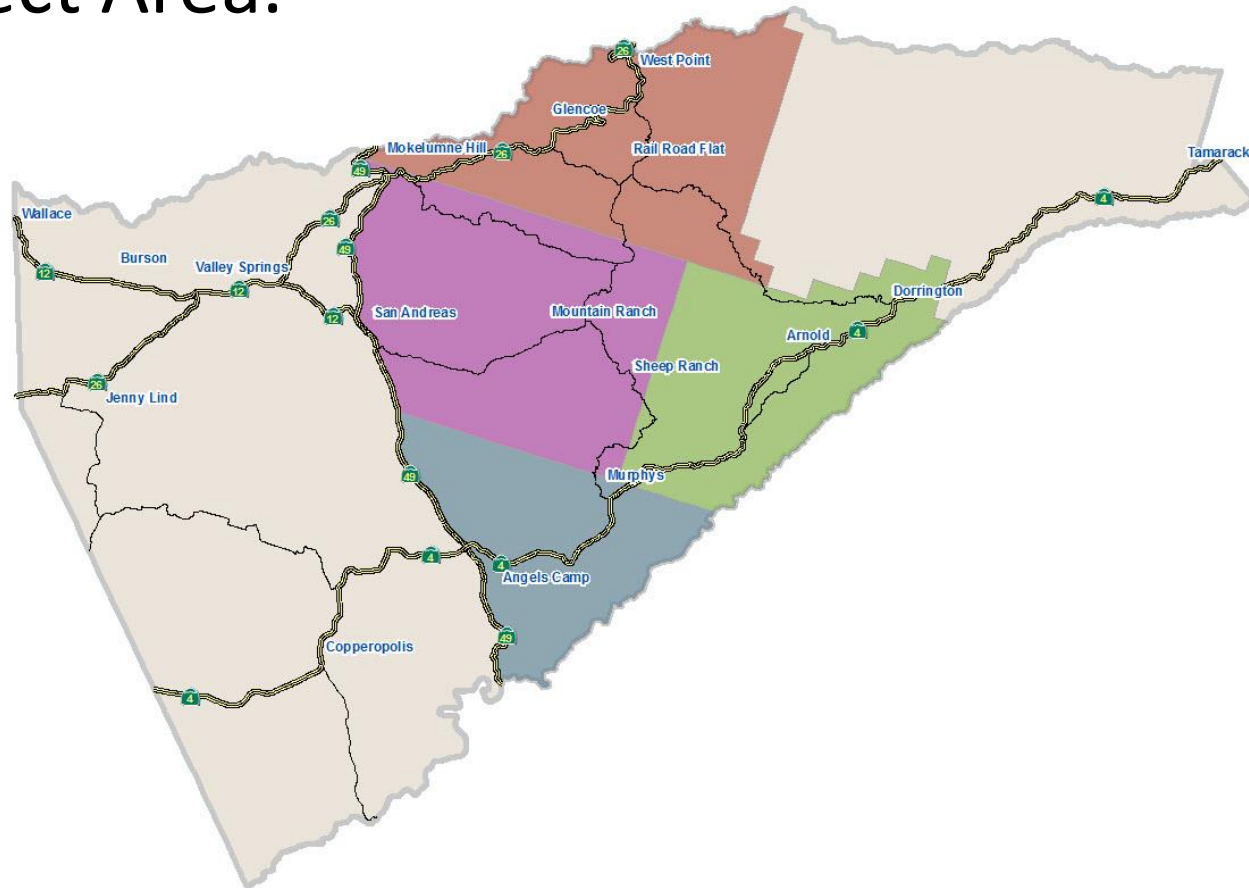
31.36636	STANDING DEAD	25.056188	15.056188	839	163.419407	6563260.77322	2225178.80886
39.27357	STANDING DEAD	11.222747	1.222747	60	274.290069	6566758.19269	2226440.5389
44.09664	STANDING DEAD	22.660289	12.660289	29	93.399702	6534644.98494	2242213.81051
71.32894	STANDING DEAD	72.818246	62.818246	673	391.315975	6572280.08782	2237631.96928
30.71016	STANDING DEAD	15.406733	5.406733	60	944.45072	6566758.19269	2226440.5389
40.88126	STANDING DEAD	21.497438	11.497438	60	977.887229	6566758.19269	2226440.5389
48.72285	STANDING DEAD	43.953158	33.953158	622	651.42044	6525212.46804	2237347.6083
35.7629	STANDING DEAD	14.632672	4.632672	60	253.217236	6566758.19269	2226440.5389
41.57027	STANDING DEAD	10.601236	0.601236	60	960.156765	6566758.19269	2226440.5389

Step 7 Determine Agencies and Add Latitude and Longitude Fields

	Height_ft	STATUS1	Dist_to_CM	DIST_EDGE	NEAR	NEAR_DIST	OWNER	LAT	LONG
	163.36099	STANDING DEAD	13.387928	3.387928	1039	998.145093	CC	38.14482	-120.414104
	117.23013	STANDING DEAD	68.548568	58.548568	1039	985.875877	CC	38.14509	-120.414049
	150.04013	STANDING DEAD	105.209654	95.209654	1039	979.648824	CC	38.144575	-120.414021
	40.88126	STANDING DEAD	21.497438	11.497438	60	977.887229	CC	38.109828	-120.47894
	35.69728	STANDING DEAD	7.93568	-2.06432	1002	964.614304	CC	38.109979	-120.478399
	30.80859	STANDING DEAD	14.992412	4.992412	1002	963.847776	CC	38.109952	-120.478422
	36.38629	STANDING DEAD	22.467066	12.467066	60	962.860937	CC	38.109938	-120.479016
	41.57027	STANDING DEAD	10.601236	0.601236	60	960.156765	CC	38.109902	-120.479017
	133.96323	STANDING DEAD	68.371666	58.371666	1039	957.535989	CC	38.145132	-120.413944
	32.77719	STANDING DEAD	18.096137	8.096137	1002	956.013244	CC	38.109951	-120.478388
	70.18059	STANDING DEAD	36.044741	26.044741	1029	953.344304	CC	38.138223	-120.425494
	68.83538	STANDING DEAD	2.784021	-7.215979	1029	947.697945	CC	38.138288	-120.425583
	30.71016	STANDING DEAD	15.406733	5.406733	60	944.45072	CC	38.109812	-120.479054
	74.74118	STANDING DEAD	11.852542	1.852542	1151	942.214374	CC	38.143524	-120.416602
	39.99539	STANDING DEAD	37.994493	27.994493	1002	941.550793	CC	38.109897	-120.478379
	122.3813	STANDING DEAD	94.205279	84.205279	1039	937.045866	CC	38.144653	-120.413881
	133.79918	STANDING DEAD	57.906632	47.906632	1039	936.94605	CC	38.144762	-120.413889
	141.083	STANDING DEAD	21.587386	11.587386	1039	929.078973	CC	38.145022	-120.413857
	38.35489	STANDING DEAD	43.051172	33.051172	72	919.188972	CC	38.113324	-120.474326
	142.23135	STANDING DEAD	119.331919	109.331919	1039	916.156252	CC	38.144607	-120.413803
	121.42981	STANDING DEAD	55.155942	45.155942	1039	881.366998	CC	38.14725	-120.411086
	113.91632	STANDING DEAD	83.270851	73.270851	1039	877.819411	CC	38.144766	-120.413683
	144.42962	STANDING DEAD	15.375258	5.375258	1039	874.795647	CC	38.14509	-120.413661
	39.30638	STANDING DEAD	42.644167	32.644167	72	872.267138	CC	38.110647	-120.477634
	132.65083	STANDING DEAD	122.374263	112.374263	1039	871.479407	CC	38.144657	-120.413653
	59.77982	STANDING DEAD	2.200962	-7.799038	1029	867.442258	CC	38.138185	-120.425838
	34.68017	STANDING DEAD	37.725796	27.725796	72	857.710107	CC	38.110333	-120.477713
	102.07191	STANDING DEAD	68.03073	58.03073	1029	853.272625	CC	38.138012	-120.42573
	144.46243	STANDING DEAD	26.866163	16.866163	1039	851.249105	CC	38.145169	-120.413567
	38.3877	STANDING DEAD	28.612505	18.612505	72	850.775427	CC	38.110431	-120.477653
	113.65384	STANDING DEAD	120.463205	110.463205	1039	843.098613	CC	38.145491	-120.413452
	58.27056	STANDING DEAD	2.784021	-7.215979	1029	841.585515	CC	38.138151	-120.425919
	40.48754	STANDING DEAD	26.004901	16.004901	1002	834.503086	CC	38.110018	-120.477724

Step 8 GROUND TRUTHING

- County GIS Staff continues to do Ground Truthing in Multiple Sites through out the Project Area.



GROUND TRUTHING RESULTS

- GIS Collector Technology proves to be very useful in identifying and collect data out in the field.
- Specified Individual Tree Locations were identified and data was collected for each location.
- Pictures and video from the field was collected and attached to each Specified Individual Tree Location through the Collector Application.
- A Significant Rate of Increase in Tree Mortality is being found at each Test Site and across the entire Project Area.

Dead Trees Identified From May/June Satellite Imagery



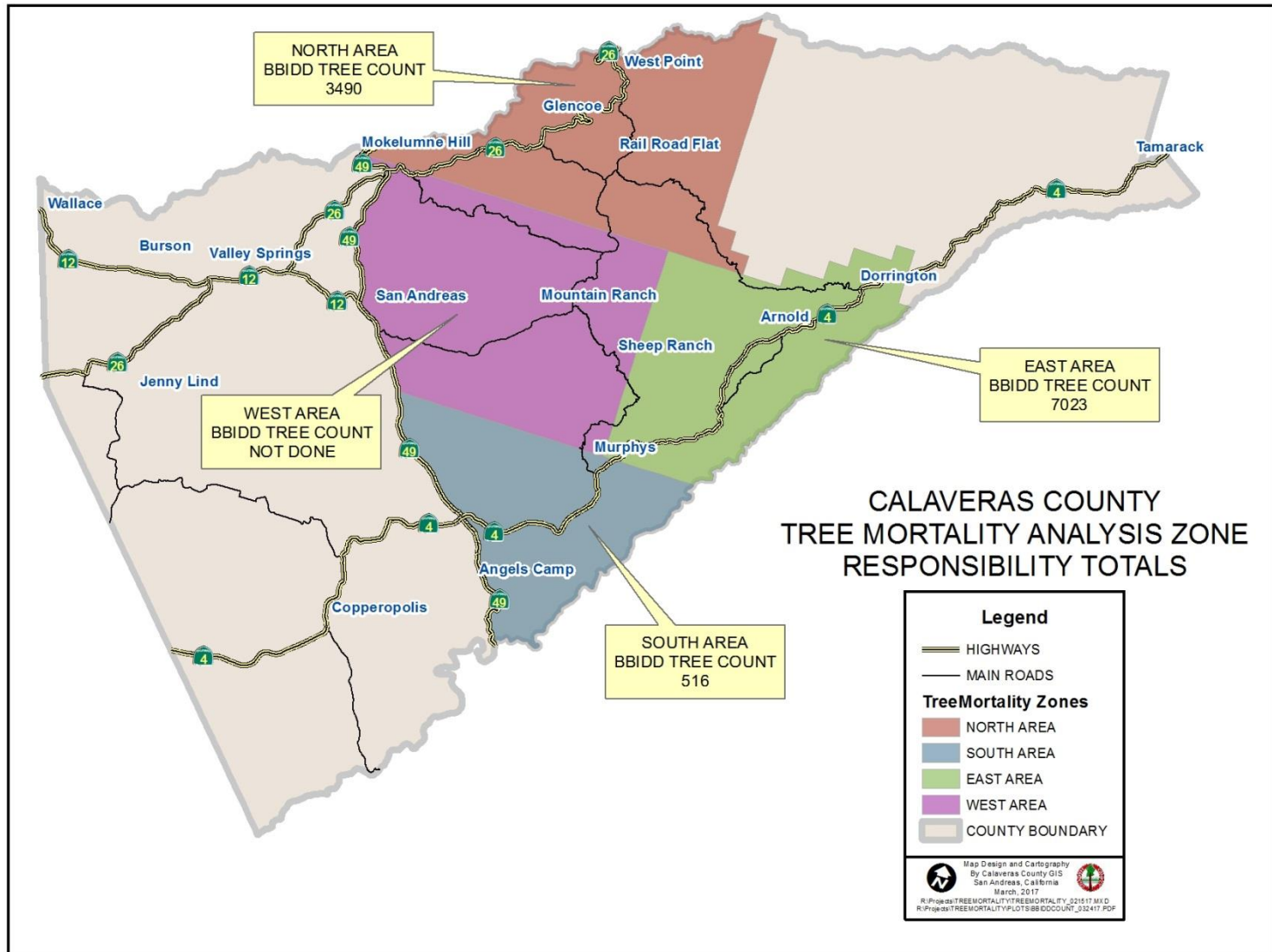
Dead Trees Identified From August/September Satellite Imagery



FINAL PRODUCT



Findings



GIS KEY TAKEWAY POINTS

- Use of LIDAR, current Satellite Imagery and GIS can provide highly accurate information for point in time analysis.
- Identified living and dead trees by location can be used in many areas to support public safety, and education to both public and government preventative planning and action groups.
- GIS Technology can be a valuable tool in planning projects and obtaining accurate tree counts to support funding requests.
- Rate of progression of Tree Mortality outpaces the ability to keep up with providing current point in time totals on Tree Mortality.
- GIS can and should be leveraged as a key contributor in Tree Mortality efforts within the County and the State.



QUESTIONS ?